

*No calculators today*

### **Playing with Polar I**

1. Coordinates – Polar and Cartesian

(a) Rewrite point  $(x, y)$  as polar coordinates in the form  $(r, \theta)$ .

(b) Rewrite (polar) point  $(r, \theta)$  as Cartesian coordinates in the form  $(x, y)$ .

2. Consider the graph of  $\left(x - \frac{1}{2}\right)^2 + y^2 = \frac{1}{4}$ . Sketch a picture. Now sketch the graph of  $r = \cos\theta$ . Use algebra to show that the graphs are identical.

3. Consider  $r = 2 \sin\theta$ . Using the method of the previous question, make an educated guess and check to determine the graph.

4. Consider the polar equation  $r = \frac{1}{\sin\theta - \cos\theta}$ . Find a Cartesian equation that produces the same graph.

5. Write a polar equation  $r = f(\theta)$  for the line  $y = 3x + 2$ .

The graphs in the first column show how  $r$  varies with  $\theta$  in rectangular form. The second column shows the polar graphs of these functions. Match up the graphs so that each pair corresponds to one equation for  $r$  as a function of  $\theta$ .

